[10191/4866]

DATA GATHERING/DATA PROCESSING DEVICE FOR VIDEO/AUDIO SIGNALS

Detailed Description

The present invention relates to a data gathering/data processing device for video/audio signals, which includes a plurality of signal processors.

5   Such a device is known from DE 101 53,484 A1, for example. The video/audio system described in that document includes at least one gathering device which supplies digital video/audio data, a plurality of processing devices (especially signal processors), a processing device being assigned to at least one gathering device, processes data of the appertaining gathering device and makes available modified

10   data, and an evaluating device that is coupled to the processing devices, and by which the modified data made available by the respective processing devices are comparable and evaluable, in order to make available a selected data record optimized for an application.

15   The present invention is based on the object of creating a data gathering/data processing device for video/audio signals which has an optimized hardware architecture.

According to the present invention, this object is attained, in the device named at the
20   outset, in that the signal processors or a subset of the signal processors are coupled to a network having a star-shaped topology.

Because of the design approach according to the present invention, a transparent hardware architecture comes about. Thus, there is developed a good scalability, the
25   same linking philosophy being applicable to all subassemblies of the device.

In particular, when using an appropriate standard such as the Ethernet standard, the expenditure for lines may be held low, since, for example, only four signal lines per signal processor are required to form the network. The susceptibility to malfunction is
30   reduced. Problems with respect to signal propagation delay and distance are avoided. A dedicated bandwidth is able to be assigned to each subassembly. Assured bandwidths of, for instance, 100 Mbit/s or 1000 Mbit/s or greater, may be

achieved. A corresponding device is able to be manufactured cost-effectively, since the hardware components required, such as hubs or switches are available as standard components.

5   A full duplex operation is able to be implemented in all signal propagation directions (transmitting and receiving) via a star-shaped wiring up of the signal processors. This makes it possible to ensure a real time operation; the real time processing of data is of decisive importance in the case of video and audio data.

10   In particular, the signal processors or a subset of the signal processors are linked to one another via the network having a star-shaped topology. It is thereby possible to exchange data between individual signal processors, in particular all signal processors being able to communicate with one another at the same time. Because of that, it is possible to implement the system described in DE 101 53 484 A1 using a

15   plurality of processing devices and an evaluating device, coupled to the processing devices, in a simple and cost-effective manner.

In particular, it is provided that the network is integrated into the device. It is for that reason that a data communication between the signal processors of the device may

20   be carried out in a simple and secure manner. As was mentioned above, signal propagation delay problems may be avoided. The unit then has a network microarchitecture, so that no external network macroarchitecture is necessary any more. The network microarchitecture, in turn, may be optimally developed, for example, with respect to bandwidth and hardware equipment (such as switches).

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In particular, the network forms a backbone for the device, that is, a backbone for the signal processors.

It is quite particularly advantageous if the network is formed according to the

30   Ethernet standard, and the data traffic on the network takes place according to the Ethernet standard. The Ethernet standard is shown in IEEE 802.3. In the Ethernet standard only four signal lines have to be provided per signal processor (whereas, for example, in the PCI bus a substantially greater number of lines has to be provided). The signal processors are able to communicate simultaneously (whereas

in the PCI bus no simultaneous communication is possible). A good scalability of the system comes about, since the same hardware philosophy applies to all subassemblies. A dedicated bandwidth may be assigned to each subassembly, which makes it possible to ensure the bandwidth, for instance, up to 100 Mbit/s or

5   1000 Mbit/s, or higher. No problems are created with regard to propagation delay and distance. Corresponding hardware components such as hubs, switches or ports are available, so that, in turn, cost-effective manufacturing is possible.

It may be provided that a hub, switch or port for the network is integrated into a

10   housing that accommodates the signal processors. Thereby a minimized number of connections may be provided for coupling the device, for instance, to the Internet or an intranet, so that a compact construction comes about.

Basically it is also possible that a hub, switch or port for the network is situated

15   externally with respect to a housing that accommodates the signal processors. Thereby one obtains, for instance, easy exchangeability.

In particular, at least one connection is provided for coupling in video--/signals. At such a connection, especially digital video/audio data, which are made available by a

20   digital video camera or by an analog camera having subsequent conversion, may be injected into the device, so that one is able to gather the data and process them. For instance, data compression and/or data evaluation may be provided.

In this connection it is favorable if two signal processors are assigned to one

25   connection. Thereby one is able to implement a video/audio system according to DE 101 53 484 A1, in which an evaluating device is coupled to a plurality of processing devices and whereby the modified data made available by the respective processing devices are comparable and evaluable, in order to make available an optimized data record selected for an application. This data record may then be transmitted, for

30   instance, via a digital network to a memory device.

At least one connection is favorably provided for transmission of data to a digital network, this connection preferably being coupled to the network of the device. Thereby, for example, one may then transmit compressed data, made available by a

signal processor, first via the digital network, to a hub, a switch or a port, and from there via the digital network.

In particular, the connection is coupled to a hub, switch or port of the network of the

5   device, so that even via the network an external communication is also possible. Thus, by the digital network one may achieve internal communication of the signal processors of the device among one another, and communication of the signal processors, and especially the transmitting of data of the signal processors, to the outside.

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The following description of preferred specific embodiments is used, in connection with the drawings, for a more detailed explanation of the present invention.

The only Figure 1 shows a schematic block diagram of an exemplary embodiment of

15   a data gathering/data processing device according to the present invention.

An exemplary embodiment of a data gathering/data processing device according to the present invention for video/audio signals, which is shown schematically in Figure 1, and is designated there, as a whole, by numeral 10, includes a housing 12, in

20   which there is situated a plurality of signal processors 14 (DSP – digital signal processors).

Device 10 has a plurality of connections 16 for injecting (digital) video/audio signals. The signals thus injected are then able to be processed by signal processors 14.

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A camera 20a, 20b, 20c and/or a microphone are interconnected to each respective connection 18a, 18b, 18c. The device may have, for instance, 32 connections, so that altogether 32 cameras and/or microphones are able to be connected. But fewer than 32 cameras/microphones may also be connected. Basically, the number of

30   connections 16 is as desired.

Cameras 20a, 20b, 20c make available video data. Device 10 receives especially digital video signals. A digital camera makes available video signals that are already digital. An a/d converter may be postconnected to an analog camera to convert the

analog video signals into digital signals. The same applies correspondingly to microphones. In Figure 1, reference numerals 20a, 20b, 20c refer to a digital camera and/or a digital microphone and/or an analog camera or an analog microphone having a postconnected a/d converter.

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At least one signal processor is assigned to each connection 16. In the exemplary embodiment shown, two signal processors 22a and 22b are assigned to connection 18a. One signal processor 24 is assigned to connection 18b. Two signal processors 26a, 26b are assigned to connection 18c.

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Because of a plurality of signal processors 22a, 22b or 26a, 26b, which are assigned to a respective connection 18a or 18c, injected video/audio signals may be gathered and processed in different ways. For instance, via signal processor 22a one may carry out a compression of the injected data. Via signal processor 22b one may

15   perform an analysis of the injected data. Via signal processor 22c one may, for instance, carry out a data comparison.

DE 101 53 484 A1 describes a corresponding video/audio system which includes a plurality of processing devices (that is, especially, signal processors), a processing

20   device being assigned to at least one gathering device (that is, especially, a connection for a camera and/or a microphone), and which processes data from the appertaining gathering device and makes modified data available, and furthermore an evaluating device, which is interconnected with the processing device, and whereby modified data made available by the respective processing devices are

25   comparable and evaluable, so as to make available a selected data record that is optimized for an application. Specific reference is made to this document. Such an evaluating device is shown schematically in Figure 1, and designated there by reference numeral 22c.

30   According to the present invention, it is provided that the plurality of signal processors 14 (or a subset thereof) is interconnected with a network 28 having a star-shaped topology, and are thereby linked to one another. Network 28 has a hub or a switch 30, connecting lines leading in from each of the corresponding signal processors (in the example shown, from signal processors 22a, 22b, 22c, 24, 26a,

26b) to the hub or switch 30. According to the present invention, a network 28 having a star-shaped topology is integrated into device 10. This network 28 links signal processors 14 of data gathering device and data processing device 10. Network 28 forms a backbone (backplane) of device 10. Network 28 is built into the device, and

5   is particularly integrated into it.

Device 10 has at least one connection 34, via which device 10 is able to be connected to a digital network such as the Internet or an intranet. For this, an appropriate interface is provided. This connection 34 is interconnected with network

10   28 and particularly to the hub or switch 30 or an appropriate port or formed by it. It may be provided, in this context, that the hub or switch 30 or the port is situated within housing 12. Basically it is also possible that the hub or switch 30 and/or the port is situated outside housing 12.

15   In one advantageous specific embodiment, network 28 is constructed according to the Ethernet standard, and the data traffic on network 28 takes place according to the Ethernet standard. The corresponding hardware elements such as the hub, switch and port are then corresponding Ethernet components. The Ethernet standard is shown in IEEE 802.3.

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In one Ethernet network 28, four data lines 32 are required from respective signal processors 14 to hub or switch 30 (Tx+, Tx-, Rx+, Rx-).

In the Ethernet standard having a star-shaped network, all signal processors 14 are

25   able to communicate with one another in full duplex mode.

By using network 28 having star-shaped topology, and particularly using Ethernet standard, the expenditure for lines may be held low, since only just four lines have to be provided for each signal processor 14. In turn, manufacturing is simplified by this.

30   There are no problems with signal propagation delay and with distance. Furthermore, hardware modules such as hubs, switches and ports are available. In addition, a good scalability comes about. Furthermore, susceptibility to malfunctioning is reduced. A certain bandwidth is assigned to each subassembly, for

instance, to signal processors 22a, 22b, which is then also able to be used appropriately.